



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005WA115B

Title: Using Stable Isotopes to Trace Nitrate Sources and Surface Water-Groundwater Interactions in the Upper Yakima River Drainage

Project Type: Research

Focus Categories: Groundwater, Surface Water, Nitrate Contamination

Keywords: Surface water-groundwater interactions, Nitrate, Stable isotope, Yakima River

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: \$27,490

Non-Federal Matching Funds: \$55,001

Congressional District: Washington 4th District

Principal Investigator:

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Abstract

The Yakima River is one of the largest rivers in Washington draining 15,760 square kilometers of forested, range, and agricultural land. Intensive irrigation in parts of the Yakima River basin provides a setting to study the effects of humans on arid region hydrology. This proposal describes a project that utilizes H, O, and N isotopes to trace surface water-groundwater interactions and nitrate sources within the upper Yakima River drainage system. We will use these stable isotopes to examine the effects of irrigation on groundwater recharge and discharge, evaporative water loss, and nitrate contamination. The study will also provide a baseline with which one can look at the how future changes in irrigation practices or land use alter the hydrologic regime.

Surface and ground waters will be sampled monthly for a transect of wells, across the Yakima River near Ellensburg. H and O isotopic compositions for these groundwater samples, combined with major ion and trace element analyses, will be compared to surface water and precipitation data and interpreted in terms of mass balance models to

determine the contributions of geochemically distinct source waters (e.g. snowmelt, irrigation waters) to the groundwater. In this way, groundwater flow paths can be delineated and compared for different seasons. In addition, N and O isotopes in dissolved nitrate from selected samples of surface water and groundwater will be analyzed to trace nitrate sources. The combination of H and O isotope analyses in waters with N and O isotope analyses of nitrate will provide a unique means to characterize the impact of irrigation and agricultural practices on groundwater in the upper Yakima River drainage.